

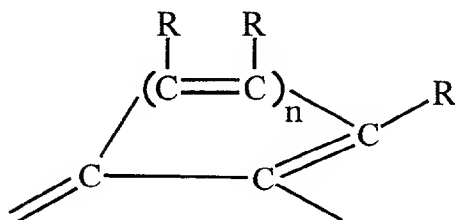
We claim:

1. A catalyst system for coordination polymerization comprising an activated Group 3 or Lanthanide metal stabilized by a monoanionic bidentate ancillary ligand and two monoanionic ligands, wherein the ancillary ligand and the metal form a metallocyclic ring comprising at least five atoms.

2. The catalyst system of claim 1 wherein the metal comprises scandium or yttrium.

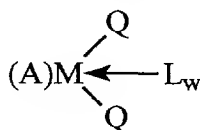
3. The catalyst system of claim 1 wherein the ancillary ligand has the formula $(C_5H_{4-x}R_x)TE$ wherein x is a number from 0 to 4 denoting the degree of substitution, each R is, independently, a radical selected from C_1 - C_{20} hydrocarbyl radicals, C_1 - C_{20} substituted hydrocarbyl radicals wherein one or more hydrogen atoms are replaced by a halogen atom, amido, phosphido, alkoxy or aryloxy or any other radical containing a Lewis acidic or basic functionality, C_1 - C_{20} hydrocarbyl-substituted metalloid radicals wherein the metalloid is selected from Group 14 of the Periodic Table of the Elements, and halogen radicals, or $C_5H_{4-x}R_x$ is a cyclopentadienyl ring in which two adjacent R -groups are joined to form a C_4 - C_{20} ring to give a saturated or unsaturated polycyclic cyclopentadienyl ligand; T is a covalent bridging group containing a Group 14 or 15 element; E is a π -donating ligand or JR'_z wherein J is an element from Group 15 or 16; z is 2 when J is a Group 15 element and 1 when J is a Group 16 element; each R' is independently a radical selected from C_1 - C_{20} hydrocarbyl radicals, a substituted C_1 - C_{20} hydrocarbyl radical wherein one or more hydrogen atoms is replaced by a halogen atom, amido, phosphido, alkoxy or aryloxy or any other radical containing a Lewis acidic or basic functionality and C_1 - C_{20} hydrocarbyl-substituted metalloid radicals wherein the metalloid is selected from Group 14 of the Periodic Table of the Elements.

4. The catalyst system of claim 1 wherein the ancillary ligand has the formula $-NR'=T'-NR'-$ wherein N is nitrogen, T' is a covalent bridging group selected from $=C(R)[C(R)=C(R)]_n-$ and



5 wherein each R is, independently, a radical selected from C_1-C_{20} hydrocarbyl radicals, C_1-C_{20} substituted hydrocarbyl radical wherein one or more hydrogen atoms is replaced by a halogen atom, amido, phosphido, alkoxy or aryloxy or any other radical containing a Lewis acidic or basic functionality, C_1-C_{20} hydrocarbyl-substituted metalloids wherein the metalloid is selected from Group 14 of the Periodic Table of the Elements, halogen radicals or two adjacent R groups are joined to form a C_4-C_{20} ring, except that R independently may also be hydrogen except for R groups attached to the carbon atoms directly bonded to the nitrogen atoms, and n is 1, 2, 3 or 4.

5. A Group 3 or Lanthanide metal complex of the formula



wherein, M is a Group 3 or Lanthanide metal;

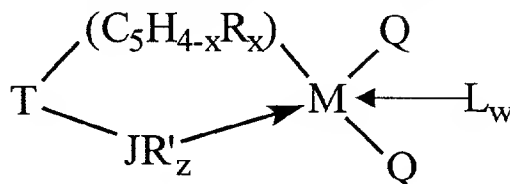
A is a monoanionic bidentate ancillary ligand which forms a metallocycle with at least 5 primary atoms;

each Q is independently a monoanionic ligand;

L is a neutral Lewis base; and

w is a number from 0 to 3.

6. A Group 3 or Lanthanide metal complex of the formula



wherein M is a group 3 or Lanthanide metal;

5 $C_5H_{4-x}R_x$ is a cyclopentadienyl ring covalently π -bound to M and substituted with from zero to four substituent groups R;

x is a number from 0 to 4 denoting the degree of substitution of $C_5H_{4-x}R_x$;

each R is, independently, a radical selected from C_1 - C_{20} hydrocarbyl radicals, C_1 - C_{20} substituted hydrocarbyl radicals wherein one or more hydrogen atoms are
 10 replaced by a halogen atom, amido, phosphido, alkoxy or aryloxy or any other radical containing a Lewis acidic or basic functionality, C_1 - C_{20} hydrocarbyl-substituted metalloid radicals wherein the metalloid is selected from Group 14 of the Periodic Table of the Elements, and halogen radicals, or $C_5H_{4-x}R_x$ is a cyclopentadienyl ring in which two adjacent R-groups are joined to form a C_4 -
 15 C_{20} ring to give a saturated or unsaturated polycyclic cyclopentadienyl ligand which may be additionally substituted with one or more R groups;

T is a covalent bridging group containing a Group 14 or 15 element;

J is a Group 15 or 16 element;

z is 2 when J is a Group 15 element and 1 when J is a Group 16 element;

20 each R' is independently a radical selected from C_1 - C_{20} hydrocarbyl radicals, substituted C_1 - C_{20} hydrocarbyl radicals wherein one or more hydrogen atoms is replaced by a halogen atom, and C_1 - C_{20} hydrocarbyl-substituted metalloid radical wherein the metalloid is selected from Group 14 of the Periodic Table of the Elements; and

25 each Q is independently a univalent anionic ligand.

7. The complex of claim 6 wherein M is scandium, yttrium or lanthanum.

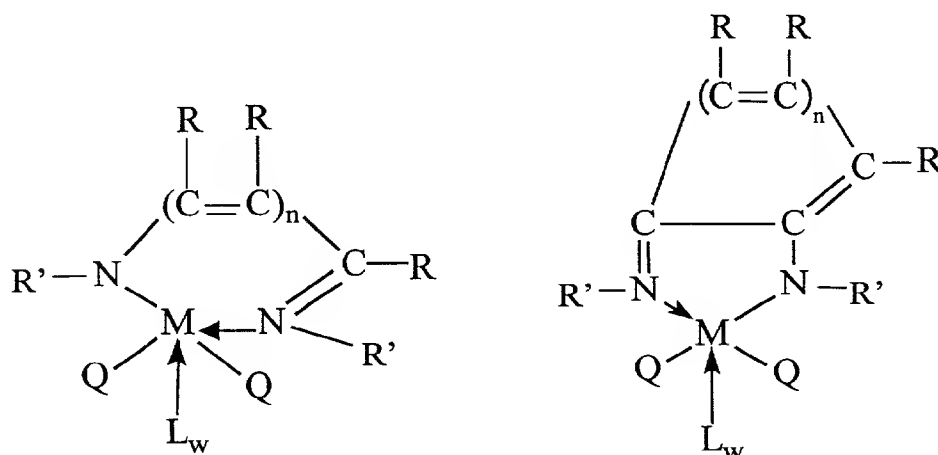
8. The complex of claim 6 wherein T is a dialkyl, alkylaryl or diaryl silicon or germanium radical.

5 9. The complex of claim 6 wherein T is alkyl or aryl phosphine or amine radical or a hydrocarbyl radical.

10. The complex of claim 6 wherein J is oxygen, sulfur, nitrogen or phosphorus.

10 11. The complex of claim 6 wherein J is nitrogen.

12. A Group 3 or Lanthanide metal complex having one of the formulae



wherein M is a Group 3 or Lanthanide metal;

each R is independently hydrogen, halogen, a C₁-C₂₀ hydrocarbyl, or a substituted C₁-

15 C₂₀ hydrocarbyl wherein one or more hydrogen atoms is replaced by a halogen atom, amido, phosphido, alkoxy or aryloxy or any other radical containing a Lewis acidic or basic functionality, C₁-C₂₀ hydrocarbyl-substituted metalloid radical wherein the metalloid is selected from Group 14 of the Periodic Table of the Elements, or two adjacent R-groups are joined to form a C₄-C₂₀ ring, except
20 that R independently may also be hydrogen except for R groups attached to the carbon atoms directly bonded to the nitrogen atoms;

n is 1, 2, 3 or 4;

each Q is independently a monoanionic ligand;

L is a neutral Lewis base; and

w is a number from 0 to 3.

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13. The complex of claim 10 wherein M is scandium, yttrium, or lanthanum.

14. A process for olefin polymerization comprising contacting one or more olefin monomers with the catalyst system of any one of the claims 1-4 under olefin polymerization conditions.

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15. A process for olefin polymerization comprising activating the metal complex of any one of claims 5-11 to a cationic form and contacting one or more olefin monomers therewith under olefin polymerization.

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16. A process for olefin polymerization comprising activating the metal complex of any one of claims 12 and 13 to a cationic form and contacting one or more olefin monomers therewith under olefin polymerization.